
Iowa Tuberculosis Control Program 2016 Annual Report



CERTAMEN AD FINEM PERGIT
THE FIGHT CONTINUES
TO THE END



President Roosevelt with (TB) Christmas Seals children, circa 1936

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Iowa Oakdale TB Sanatorium

FOREWORD

TB remains a major health problem globally, in the U.S. and in Iowa, killing an estimated 1.3 million people annually. Despite this grim statistic, TB morbidity rates are declining in the U.S. and around the world. In Iowa, TB case rates remain relatively stable due to the influx of immigrants and refugees from areas of the world where TB is prevalent. Vigilance is required to properly treat and cure patients to prevent treatment relapse, treatment failure or the development of acquired drug resistant TB. Declines in funding, misdiagnosis and challenging clinical case management still plague TB Control efforts in the United States.

PURPOSE AND OVERVIEW

The purpose of this report is to provide a summary of Tuberculosis (TB) in Iowa and the activities and achievements of the TB Control Program and our partners during the 2016 calendar year. This report provides Iowa-specific TB rates, funding sources, and program-specific data, often in ten-year time lines to more accurately reflect trends.

Previous reports included TB control efforts by the World Health Organization and the Centers for Disease Control and Prevention. Reports paid tribute to the role TB disease played in the history of man including historical TB treatments, myths, and bygone TB control practices. The 2016 Report does not include these overviews. Please refer to previous reports for this information.

The annual report serves as an informational resource for stakeholders, local partners, policy makers and others interested in Iowa's TB Control efforts. The report is available for download on the TB Control Program Web page <http://www.idph.state.ia.us/ImmTB/TB.aspx?prog=Tb&pg=TbHome>.

IOWA'S TB CONTROL PROGRAM

The TB Program is comprised of two full time employees: the Program Manager and the Nurse Consultant. The program provides direct oversight of cases afflicted with latent tuberculosis infection (LTBI) and TB disease from admission to discharge in the TB Control Program. This includes consultation with physicians, nurses, local public health agencies (LPHAs) and other healthcare providers regarding TB transmission, pathogenesis, treatment, signs and symptoms, infection control practices, and contact investigations.

The purpose and scope of responsibilities is defined by the core functions of the TB Control Program which include:

- Disease consultation and education
- Investigation of active or suspect TB cases
- Case management of LTBI and active TB cases
- Administration of Iowa's TB Medication Program
- Data management and analysis
- Administration and finance

The number of TB cases in Iowa, as in the rest of the U.S., has significantly declined since the discovery of antibiotics that kill the TB bacilli. Despite drugs that can cure TB disease, TB remains a significant public health issue in Iowa and the rest of the country. The 2016 TB case rate for Iowa is 1.54 cases per 100,000 persons. This is significantly lower than the 2016 national average of 2.8 cases per 100,000 persons. Iowa owes its low TB case rate in part to proficient contact investigations, healthcare providers observance of treatment guidelines, adherence to DOT for active disease cases and the provision of medication for LTBI to approximately a thousand Iowans annually.

A 3D bar chart titled "Average Number of Iowa TB Cases Each Year by Decade". The vertical axis is labeled "Cases" and ranges from 0 to 800 with major grid lines every 200 units. The horizontal axis is labeled "Decade" and lists nine decades: 1930-39, 1940-49, 1950-59, 1960-69, 1970-79, 1980-89, 1990-99, 2000-09, and 2010-16. The bars are dark blue. The number of cases for each decade is displayed above its respective bar: 555, 757, 628, 255, 114, 66, 65, 43, and 46. The chart shows a significant peak in the 1940-49 decade and a general downward trend thereafter.

Decade	Average Number of Cases
1930-39	555
1940-49	757
1950-59	628
1960-69	255
1970-79	114
1980-89	66
1990-99	65
2000-09	43
2010-16	46

In 2016, Iowa reported 48 cases of active TB disease. Since 2007, Iowa has averaged 46 cases of TB each year. (Figure 2: Number of TB cases 2007 - 2016). Although case rates are declining, many cases have existing co-morbidities that make TB treatment considerably more complex and require extensive care, including the use of second line drugs.

Year	Cases
2007	43
2008	49
2009	42
2010	48
2011	40
2012	46
2013	47
2014	54
2015	38
2016	48

[illegible]

The program prioritizes the detection and treatment of persons with LTBI to prevent future cases of TB disease. Figure 4 illustrates that the Program issues greater than 1,100 LTBI prescriptions on average each year to lowan's diagnosed with LTBI. Left untreated, 5-10% of persons with LTBI will develop TB disease. The only way to eliminate TB disease is to treat and cure all persons diagnosed with LTBI.

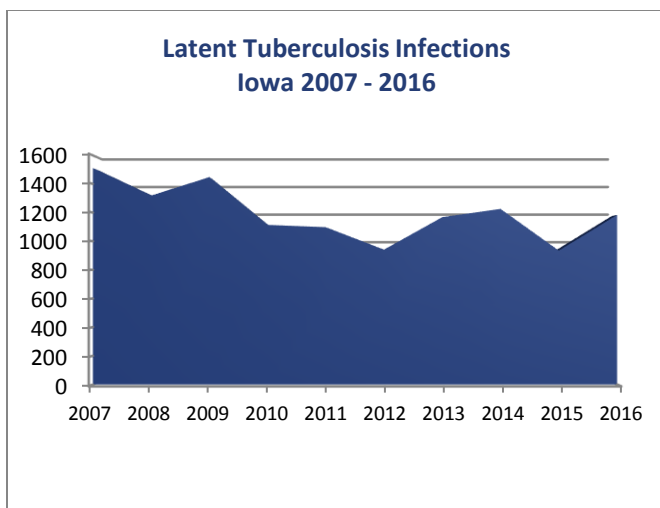


Figure 4: Number of LTBI cases each year from 2007 – 2016

The length of LTBI treatment (up to nine months) coupled with a lack of public health resources, results in patients having to complete LTBI treatment on their own accord, just like with other illnesses. Significantly shorter treatment regimens paired with public health monitoring is the only method that will achieve TB elimination

Figure 5 represents the percentage of patients who completed treatment from 2006 - 2015. During this period, all patients with infectious TB completed treatment. Patient's not completing treatment had extrapulmonary TB, were not infectious and did not represent a public health risk.

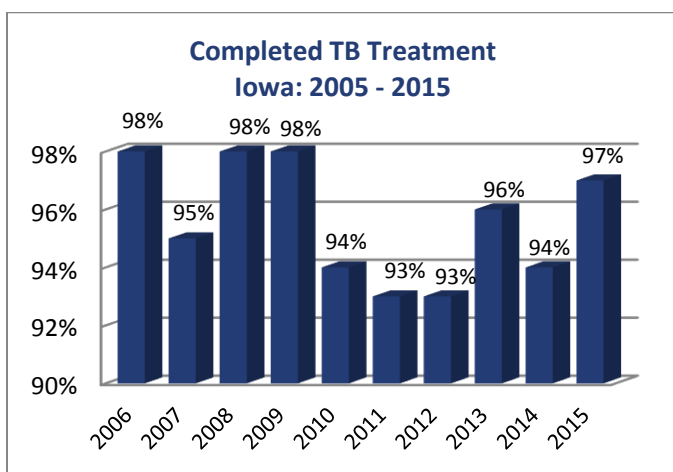


Figure 5: Percentage of Iowa TB Cases Who Complete Therapy 2006-2015

It is very important that people who have TB disease finish the medicine, taking the drugs exactly as prescribed. If they stop taking the drugs too soon, they can become sick again; if they do not take the drugs correctly, the TB bacteria that are still alive may become resistant to those drugs. TB that is resistant to drugs is harder and more expensive to treat.

DIRECTLY OBSERVED THERAPY (DOT)

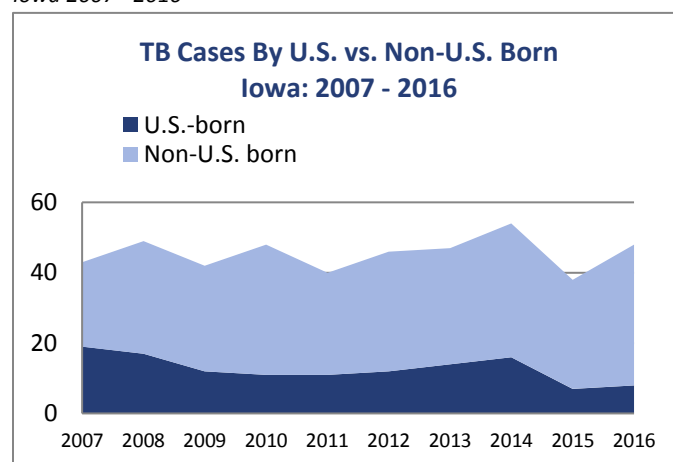
DOT is a strategy used by public health officials to assure patients with TB disease are correctly treated and cured. DOT is the standard of care for all patients afflicted with TB disease. The Centers for Disease Control and Prevention (CDC), Infectious Diseases Society of America (IDS), World Health Organization (WHO), and the American Thoracic Society (ATS) recommend healthcare providers implement DOT on each case of TB disease. With DOT, a designated healthcare worker watches a patient swallow each dose of TB medication. Without DOT, many patients do not take their medication properly, resulting in disease relapse, treatment failure and development of drug resistance, including multidrug-resistant TB (MDR-TB).

In 2001, the Iowa TB Control Program began providing DOT incentive funds to increase the proportion of TB patients who receive DOT. Since implementation of incentive funding, DOT rates have risen 40% in Iowa. During this time-period, virtually all pulmonary (infectious) cases of TB have had the benefit of DOT. Clinical benefits of DOT include significant reduction in disease relapse, treatment failure and development of multidrug-resistant TB (MDR-TB).

COUNTRY OF ORIGIN DATA

The proportion of reported TB cases in non-U.S. born persons has increased significantly in the past two decades. In 1995 for example, non-U.S. born persons accounted for 38% of reported TB cases in Iowa. From 2007 - 2016, non-U.S. born persons accounted for 71% of reported TB cases in Iowa. Non-U.S. born persons' account for only four percent of the Iowa population, highlighting the disparity. The decreasing numbers of U.S. born cases are due in part to effective TB control practices in this country.

Figure 6: Percent of U.S. born Versus Non-U.S born TB cases in Iowa 2007 - 2016



In many parts of the developing world, TB is still widespread and remains a leading cause of death. Immigration of people from these countries to the United States illustrates what happens in one part of the world, directly impacts other parts of the world. Effective targeted testing programs for newly arriving refugees, immigrants, and students play a major role to identify and treat these populations.

From 2007-2016, 322 individuals, emigrating from 48 countries (excludes U.S.) developed TB disease after their arrival to Iowa (Figure 8). India and Mexico account for 30% of the TB morbidity in Iowa during this time period. As the map illustrates, TB anywhere is TB everywhere. Approximately 95% of all patients with active TB disease live in the developing world, where 99% of all TB deaths occur. TB is a good example of the global nature of public health. It is important to implement consistent and aggressive public health measures to halt TB disease, which left untreated, kills half of its victims.

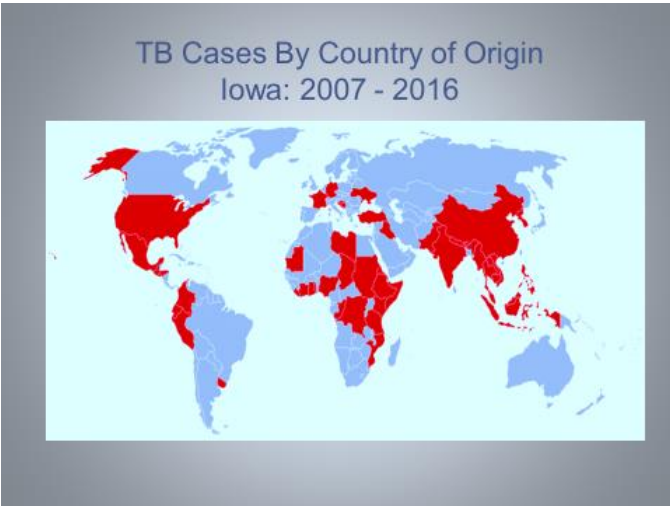


Figure 7: Country of Origin by Global Representation: Iowa 2007-2016

In Iowa, seven countries, led by India and Mexico, account for 196/322 (61%) non U.S. born TB cases from 2007 – 2016 (figure 8). Thirty-eight other countries complete the TB morbidity, further illustrating the global burden of TB.

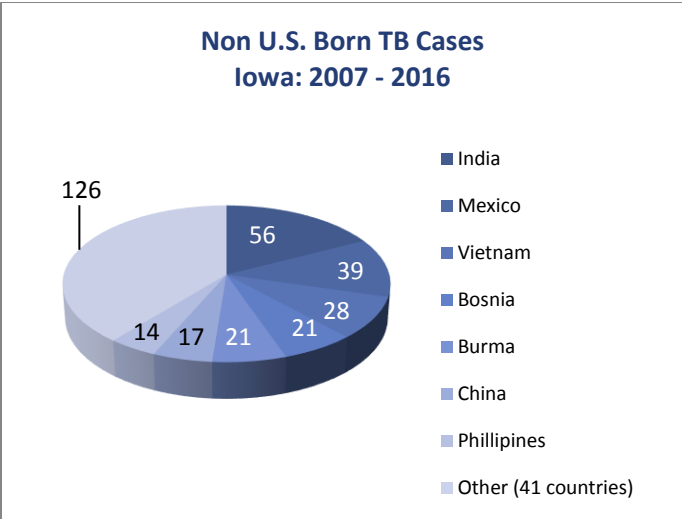


Figure 8: Iowa TB Cases by Country of Origin 2007-2016

SITE OF DISEASE

The lungs are the most common site for TB disease, but any organ or body site may be involved. TB of the pleura (lining of the lungs) and lymph nodes is the most commonly occurring form of extrapulmonary tuberculosis. In Iowa, pulmonary cases accounted for 63% of the total cases during the last ten years (Figure 9). Patients with either pulmonary (lungs) or laryngeal (throat) TB are usually infectious.

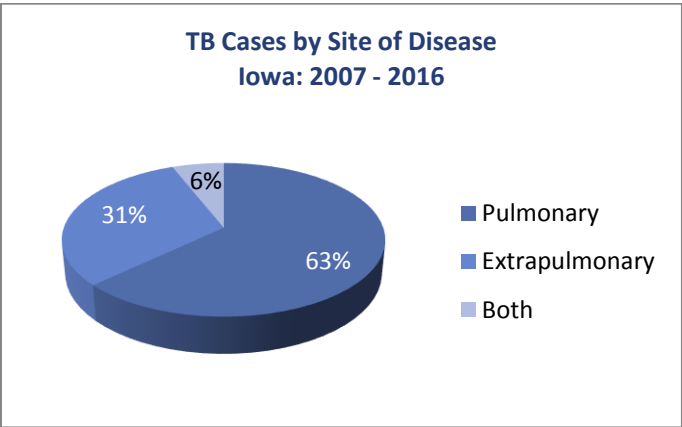


Figure 9: Iowa TB Cases by Site of Disease 2007-2016

CONTACT INVESTIGATIONS

All infectious cases require a contact investigation by a LPHA to identify contacts who:

- Have LTBI so treatment for LTBI can be given and active disease can be prevented.
- Have TB disease so they may be treated and further transmission can be stopped.

TB Contact Investigations, Iowa 2007-2016	
Cases for investigation:	253
Number of contacts identified:	4,146
Number of contacts who completed evaluation:	3,601 (87%)
Number of LTBI identified:	723 (20%)
Number of TB cases identified:	22 (<1%)

Figure 10: Contact Investigation Data

Each infectious TB case in the United States has 10 contacts identified on average per CDC. Approximately, 20%-30% of all contacts have LTBI, and 1% has TB disease. Of those contacts that ultimately will have TB disease, approximately half acquire disease in the first year after exposure. For this reason, contact investigations constitute a crucial prevention strategy.

LPHAs in Iowa are responsible for conducting investigations of infectious TB. Public Health agencies work closely with other agencies (e.g., Community Health Centers, private providers, labs etc.) to ensure the prompt reporting of suspected TB cases. A major challenge for LPHAs is the time involved to complete contact investigations. In order to be considered “evaluated”, contacts to infectious TB cases must complete all TB testing, often requiring two TB tests. Persons with positive tests require a medical evaluation to include a chest x-ray to rule out active TB. LPHAs spend considerable amounts of resources in their efforts to complete the evaluation of contacts exposed to infectious TB.

The TB Control Program Manager and TB Nurse Consultant provide consultation to LPHAs on each infectious case of TB. Consultation consists of:

- When to initiate a contact investigation
- Assigning priorities to contacts
- Diagnostic and public health evaluation of contacts
- When to expand a contact investigation, and
- Data management of contact investigations

Contact investigations are timely, costly and consume limited resources from local, state and federal assets. “Contact investigations typically require hundreds of interdependent decisions, the majority of which are made on the basis of incomplete data, and dozens of time consuming interventions.”¹ For these reasons, consultation and collaboration among LPHAs and the TB Program is vital to the diagnostic and public health evaluation of contacts.

TB Control Program Funding

In 2016, the TB Control Program received funds from the federal TB Cooperative Grant and state funds totaling \$528,238. Federal funds comprise 76% of the total budget while state funds comprise 24% of the program finances. (Figure 11)

Funding Source 2016	
Federal TB Cooperative Grant	\$401,856
State Prescription Services	\$70,295
State TB	\$56,087
Total	\$528,238

Figure 11: 2016 total program funds

Program expenditures are divided into three main categories: **program infrastructure** (staff salary and operating expenses), **contracts** (including incentive funding for LPHAs to conduct directly observed therapy, pharmacy for prescription services and the State Hygienic lab)), and **TB medications**.

The funding distributions for these three categories are illustrated in Figure 12.

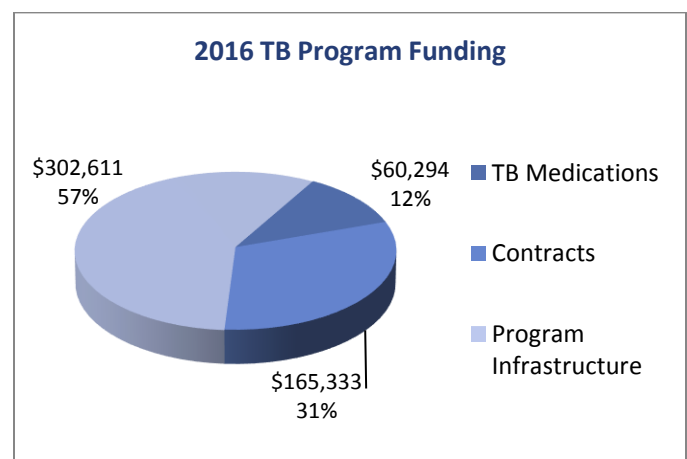


Figure 12: 2016 total program funds by funding source

¹ Guidelines for the Investigation of Contacts of Persons with Infectious TB – Recommendations from the National TB Controllers Association and CDC.

Figure 13 illustrates how the TB Program disperses available contractual funds. LPHAs receive incentive funding for DOT and medical evaluation services. The funds for the pharmacy service support providing free antibiotics for all Iowans with LTBI or TB disease. Funds for the State Hygienic Lab support rapid identification of TB, smear, culture and drug sensitivity testing.

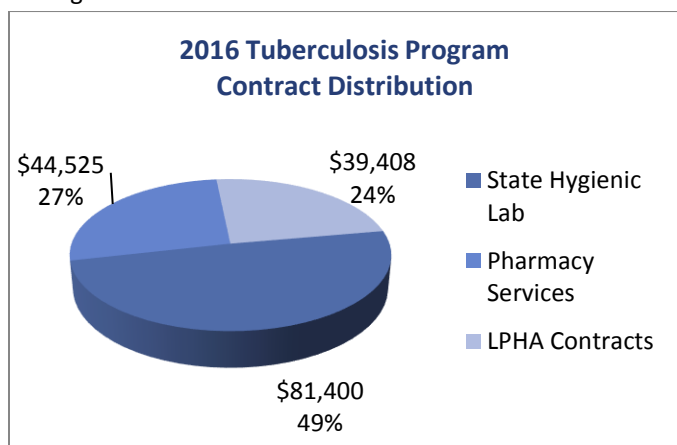


Figure 13: 2016 total funds distribution

CONTRACT SERVICES

STATE HYGIENIC LAB

The TB Control Program contracts with the State Hygienic Lab (SHL) through the *Tuberculosis Elimination Cooperative Agreement*. In 2016, the TB Control Program contract amount with SHL was \$81,400 as demonstrated in figure 13. This agreement allows SHL to be the primary source for public health submission of suspect TB patient's specimens (typically sputum) for evaluation. The goal of SHL is to provide objective information within 24 - 48 hours of specimen receipt for smear and TB NAAT (rapid detection of MTB complex as well as rifampin drug resistance). SHL works with CDC to transfer clinical specimens of patients for whom second line drug testing is necessary. Additionally, SHL coordinates genetic testing of all culture positive MTB specimens with CDC to allow genetic linking of cases nationwide. The ability to rapidly and accurately detect drug resistance in *Mycobacterium tuberculosis* Complex (MTBC) clinical isolates is critical for the appropriate treatment of patients suffering from TB and the effectiveness of the TB Control program.

SHL also is one of the few labs in the state that performs Interferon-Gamma Release Assays (IGRAs). IGRAs are whole-blood tests that can aid in diagnosing TB infection. SHL offers two IGRAs that have been approved by the U.S. Food and Drug Administration (FDA) and are commercially available in the U.S: QuantiFERON TB Gold In-Tube test (QFT-GIT); and T-SPOT® TB test (T-Spot). IGRAs are of particular use to LPHAs in the course of a contact investigation to an infectious TB patient. In a contact investigation, IGRAs are offered to Iowa citizens free of charge through the SHL.

Pharmacy Services

The TB Program contracts with NJL Pharmacy of Pleasant Hill, Iowa to dispense TB medications for both LTBI and active TB disease patients. In 2016, the TB Control program spent \$60,294 on TB medications for Iowa citizens (Figure 12). The contract for pharmacy services is \$44,525 as demonstrated in Figure 13.

LOCAL PUBLIC HEALTH AGENCIES

Iowa is unique in its ability and desire to provide incentive funding for LPHA's who provide directly observed therapy (DOT) to active pulmonary patients in their county. DOT is a standard of care for TB in which patients are observed to ingest each dose of anti-tuberculosis medications, to maximize the likelihood of completion of therapy. Programs utilizing DOT as the central element in a comprehensive, patient-centered approach to case management (enhanced DOT) have higher rates of treatment completion than less intensive strategies.

The CDC, American Thoracic Society (ATS) and Infectious Disease Society of America (IDSA) all recommend healthcare providers implement DOT on each active case of TB. Eligibility of LPHAs for DOT incentive funding may vary by funding cycle due to funding availability and the number of TB cases; but generally, all infectious (pulmonary and laryngeal), pleural, HIV positive, and childhood cases of TB disease are eligible. In 2016, the Iowa TB Control Program spent \$39,408 on contracts with LPHAs for DOT services as shown in Figure 13.